

II. **Remarks**

A. **Status of the Claims**

Claims 1-10, 17-26, and 28-42 were pending at the time of the Action. Claim 36 has been amended in the amendment contained herein. Support for these amendments may be found in the specification at, for example, page 3, line 28. Therefore, claims 1-10, 17-26, and 28-42 are now pending.

B. **The Indefiniteness Rejection is Moot**

Claim 36 was rejected as indefinite due to the recitation of “an alkali salt having a concentration of 3.0-10.0 equivalents/Kg water.” In the interest of advancing the prosecution, Applicants have amended claim 36 herein to recite “an alkali salt having a concentration of 4.0-10.0 equivalents/Kg water.” It is therefore believed that the indefiniteness rejection is now moot, and Applicants respectfully request that it be withdrawn.

C. **The Claims Are Non-Obvious**

Claims 1-10, 17-26, and 28-42 were rejected as obvious over US Pat. No. 5,017,350 to Hakka, et al. (“Hakka”). The Action concedes that Hakka fails to disclose the alkali salt concentrations recited in independent claims 1, 17, 26, and 36, but it nevertheless contends that it would have been obvious to adjust the concentration of the alkali salt to meet the claimed concentrations “and thereby produce optimal working results.” The Action at ¶¶ 11, 22, 33, and 44. Applicants respectfully traverse these rejections, for the reasons set forth below.

The Examiner is relying on case law allegedly standing for the proposition that “[t]he discovery of an optimum value of a known result effective variable, without producing any new or unexpected results is within the ambit of a person of ordinary skill in the art.” The Action at, e.g., ¶ 11 (citing *In re Boesch*, 205 USPQ (CCPA 1980), and MPEP § 2144.05). However, as set forth in MPEP §2144.05, a particular parameter must *first* be recognized as a result-effective

variable, *i.e.*, a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.

In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). As recognized in several decisions by the Board of Patent Appeals and Interferences, the burden is on the Examiner to establish that a particular parameter is recognized as a result-effective variable in order to invoke “optimization” case law, and that burden has not been met in this case, nor could it. *See, e.g., Ex parte Johnson*, Appeal No. 2010-003975, Application No. 09/950,985, Decision on Appeal mailed 7/22/2010 (reversing obviousness rejection based on finding that Examiner failed to produce evidence that prior art recognized certain parameter as a result-effective variable).

The **only** mention of alkali salts in Hakka comes in the following brief paragraph:

The absorbing medium may contain mixtures of amine sorbents. Other components, e.g., alkali salts, may be present as additives to, for instance, retard sulphite or bisulphite oxidation, maintain pH and serve as cosolvents.

Hakka at col. 8, lines 15-19. Nowhere in that paragraph, nor anywhere else in Hakka, is there a recognition that the specific results listed in Hakka (*i.e.*, retarding sulphite or bisulphite oxidation, maintaining pH, and serving as a cosolvent) are dependent upon the concentration of alkali salt in the absorbing medium. Therefore, alkali salt concentration is not recognized as a result-effective variable for any result in Hakka, much less the specific results disclosed in the present application (which are not disclosed in Hakka, as explained below). Optimization of a parameter not recognized as being result-effective is not *prima facie* obvious. *In re Antonie*, 559 F.2d at 620.

Moreover, even if there was a recognition in Hakka that the alkali salt concentration was a result-effective variable for the specific results listed in Hakka, the Examiner has not come forward with any evidence, nor could it, that optimizing the concentration of alkali salt for the

specific results listed in Hakka would necessarily result in Applicants' claimed concentrations. This is because, as discussed in the present specification, Applicants include alkali salts in their absorbing medium for results that are different from those disclosed in Hakka. Specifically, as discussed in the previous Response and explained at pages 2 and 8-9 of the specification, it had been thought previously that concentrations of piperazine (PZ) greater than 1.3 m cannot be used in a CO₂-rich environment due to the formation of piperazine carbamate that precipitates from the solution. *See, e.g.,* U.S. Pat. No. 4,336,233 at col. 3, lines 7-18 (stating that "the use of piperazine alone as the washing agent is of limited applicability . . . [because] larger amounts than 1.3 mole / l cannot be used because in the presence of CO₂ . . . the carbamate of piperazine precipitates . . ."). Furthermore, the claimed concentrations of polyamine had been thought infeasible due to amine volatility. The specification at 2. However, Applicants discovered the surprising and unexpected result that greater concentrations of polyamines are feasible in a CO₂-rich environment without precipitation of solids and/or evaporation of the amine when used with certain concentrations of alkali salts because the interaction of the alkali with the amine and the CO₂ avoids solid precipitation and reduces the volatility of the amine, especially with PZ. *See* the specification at, e.g., page 9, lines 6-11 (discussing result of avoiding solid precipitation) and page 14, lines 30-32 (discussing result of reducing amine volatility).

Nowhere does Hakka acknowledge or recognize that the higher concentrations of amine it allegedly discloses were not thought to be possible with piperazine in a CO₂-rich environment due to the formation of piperazine carbamate that precipitates from the solution with concentrations of piperazine greater than 1.3 m. In fact, Hakka appears to teach that the absorbing medium need not be single phase (*see* col. 7, lines 62-64), which confirms that Hakka does not even view solid precipitation generally as a problem needing to be solved.

Furthermore, nowhere does Hakka recognize that the higher concentrations of polyamine it allegedly discloses had been thought infeasible due to amine volatility. Thus, it certainly cannot be argued that one of ordinary skill in the art would have had a reason, based upon Hakka, to “optimize” the alkali salt concentration to achieve the particular results of avoiding solid precipitation and reducing amine volatility. Again, optimization of a parameter not recognized as being result-effective is not *prima facie* obvious. *In re Antonie*, 559 F.2d at 620.

For at least these reasons, claims 1-10, 17-26, and 28-42 are not obvious over Hakka. Therefore, Applicants respectfully request the withdrawal of these rejections.

D. Conclusion

In light of the foregoing, Applicants respectfully submit that all claims are in condition for allowance. The Examiner is invited to contact the undersigned with any questions, comments, or suggestions relating to the referenced patent application.

Respectfully submitted,

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